Jun 21st, 1:15 PM - 1:30 PM

Modeling: Using 2D HEC-RAS to Determine Fish Passability and Habitat Quality

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Using 2D HEC-RAS to Determine Fish Passability and Habitat Quality

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Background

- 1D RAS solves dynamic St. Venant mass and momentum equations in one dimensions
  - User determines which direction water will flow
- 2D RAS solves dynamic St. Venant mass and momentum equations in two dimensions (laterally, not depth-wise)
  - Terrain determines which direction water will flow

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When to Use 2D RAS

- Off-channel storage areas
- Undefined boundary between channel and banks
- Bends
- Flow direction changes at different flows/stages
- Complex ineffective areas

When Not to Use 2D RAS

- Bridges
- Salinity/temperature/water quality
- 1D modeling is sufficient
- Good topographic data not available

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Ease of Use

1. Define projection
2. Develop terrain (TIN) and land coverage (shp)
3. Develop mesh
4. Define boundary conditions
5. Run model
6. View results

*(repeat from step 2 if desired)

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RASMapper

- Currently a post-processing tool
- Greater visualization capabilities
- Maps results on terrain
- Adjust terrain within RASMapper

- Developing RASMapper to do pre-processing as well

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Area Background

Photo by N. Wilcox http://www.panoramio.com/photo/20364299

Photo by Shane Gill http://www.panoramio.com/user/2757107

- Canal carries the bulk of the water
- Restoration area was a golf course
- Stream historically moved through the golf course out into the bay
- Neglected tidal influences for this example

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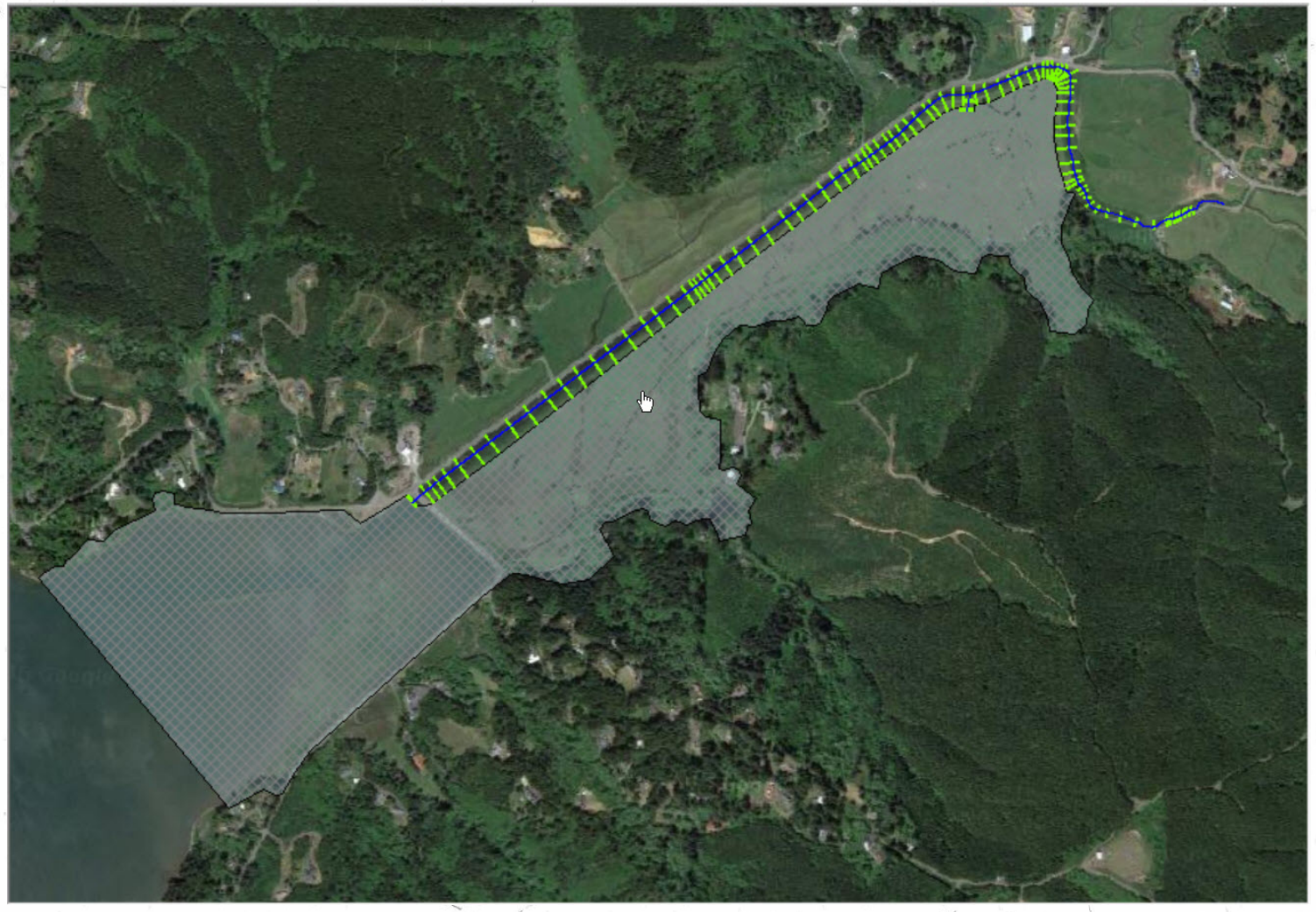
Model Setup



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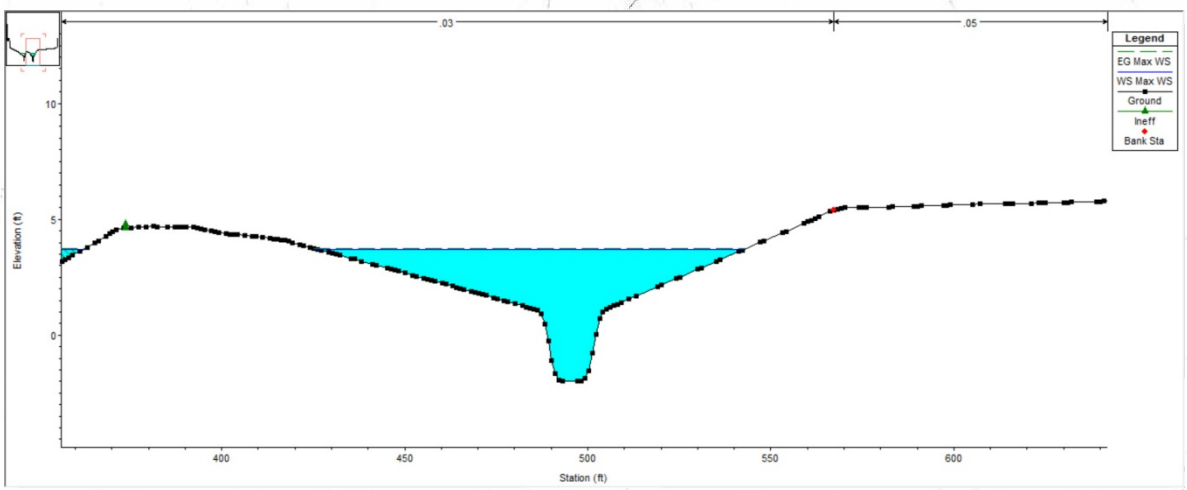
Restoration Area Details

- Restored area max slope: 0.1%
- Representative channel dimensions: 18 ft across, 3 ft deep
- Restoration reach length: 1 mile
- Cell size: 20 ft grid



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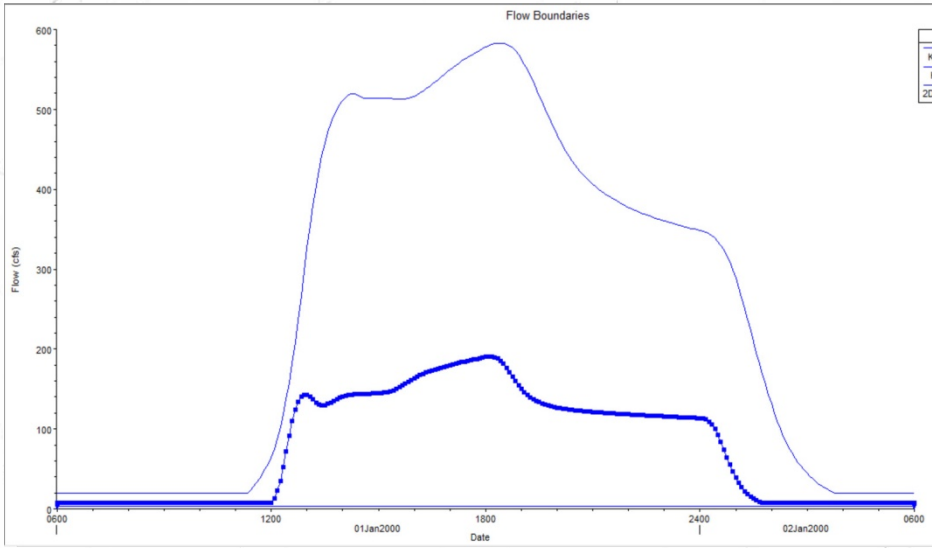
1D 2-year

Vel	Color
0.00	
0.4	
0.8	
1.1	
1.5	
1.8	
15.00	

2D 2-year



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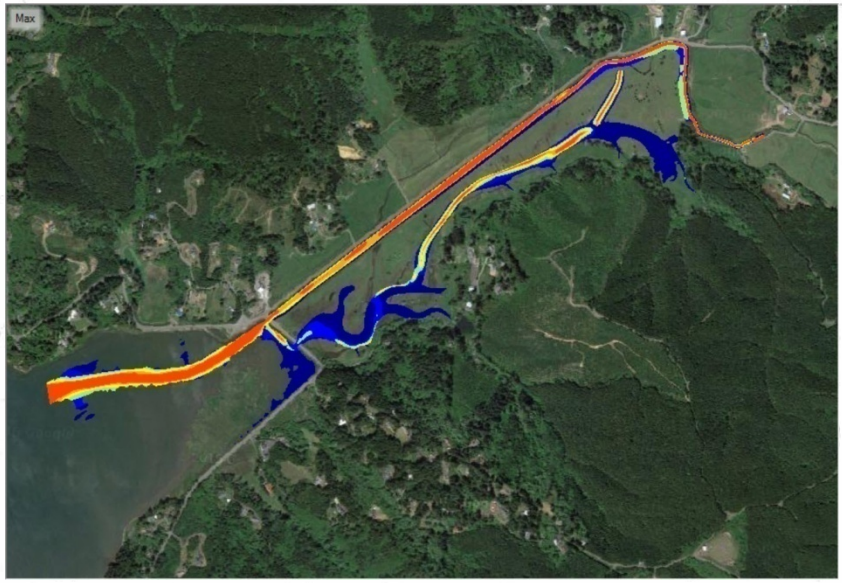
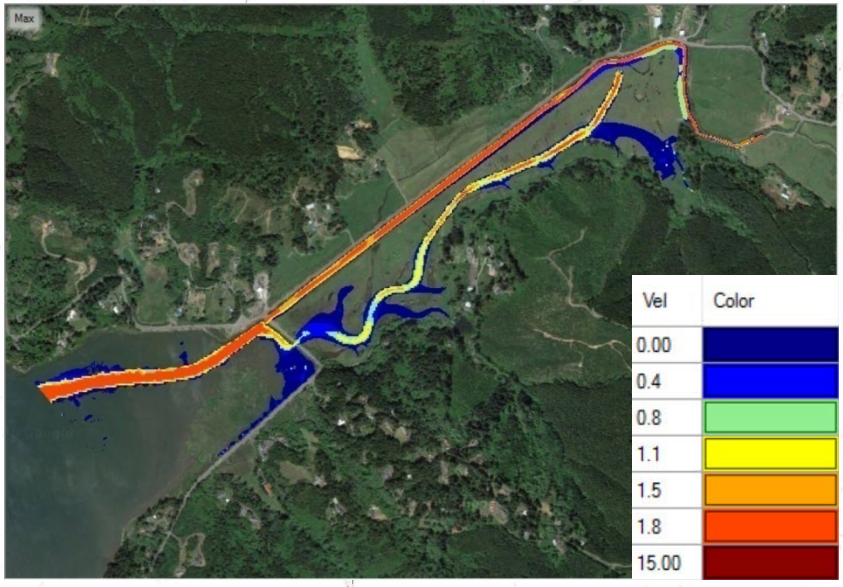
1D 2-year

2D 2-year





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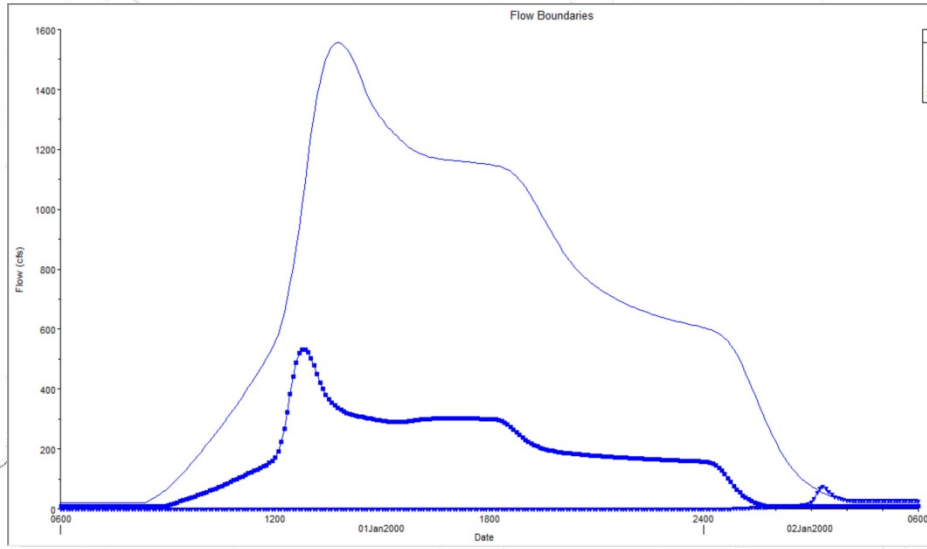
1D 50-year

Vel	Color
0.00	
0.4	
0.8	
1.1	
1.5	
1.8	
15.00	

2D 50-year



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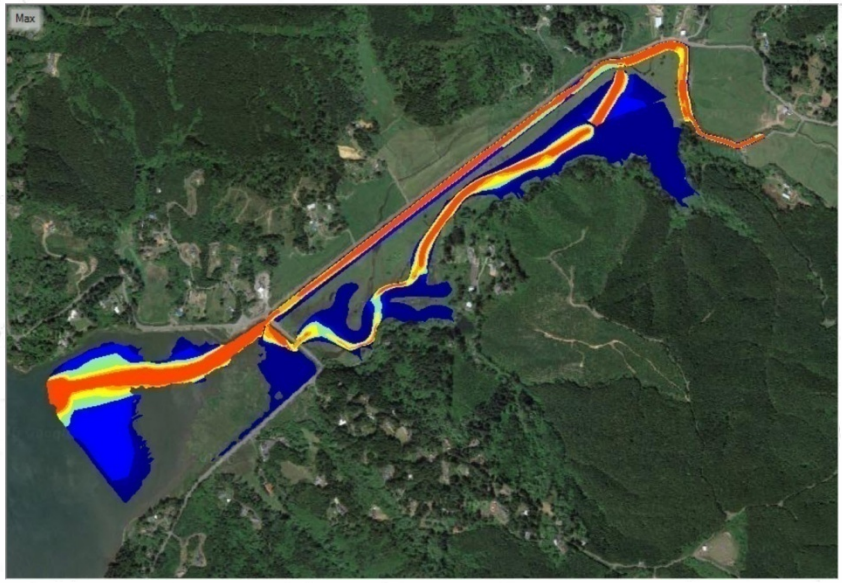
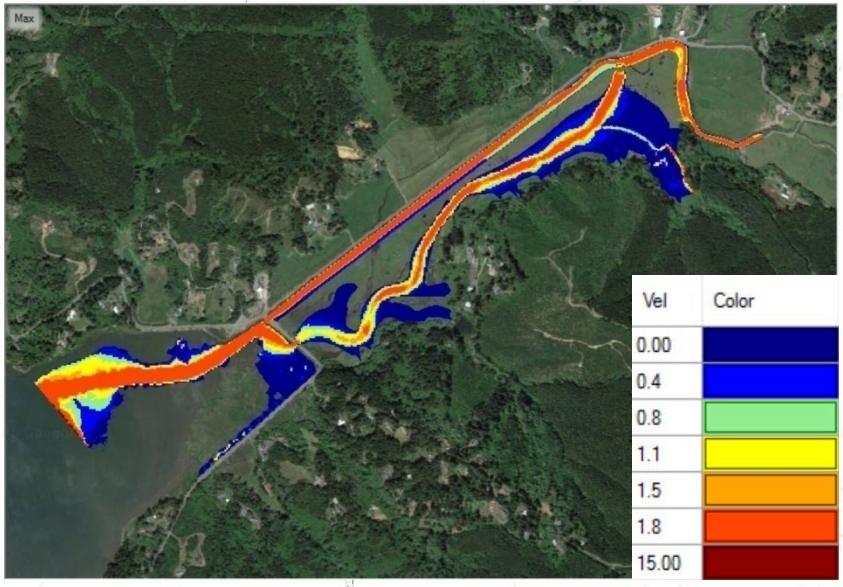
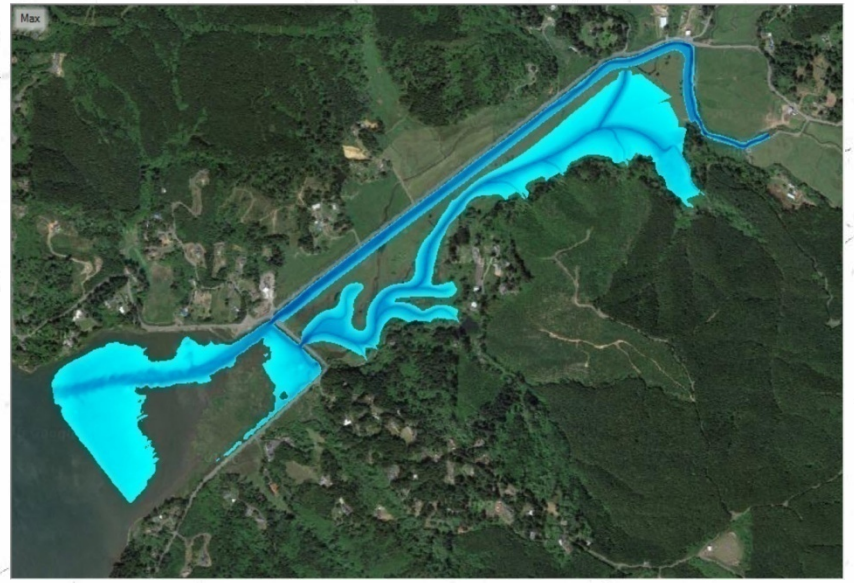
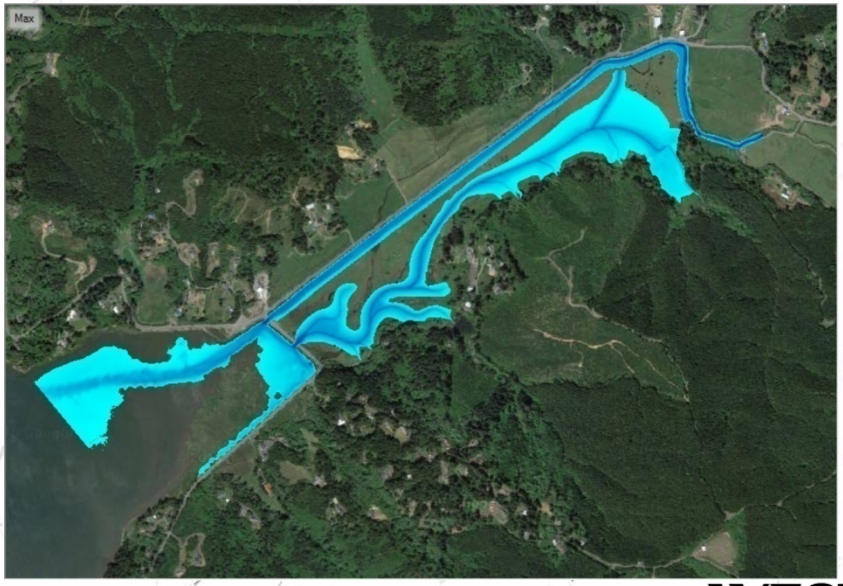
1D 50-year

2D 50-year









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Adjust Terrain

- Can edit terrain in 2d model using:
  - 1d cross sections within RAS
  - Terrain editors in GIS
- Adjustments
  - Step-pool sequence
  - Add sinuosity
  - Disconnect pools
  - Natural in-stream structures
- Could edit n-values as well (in GIS)

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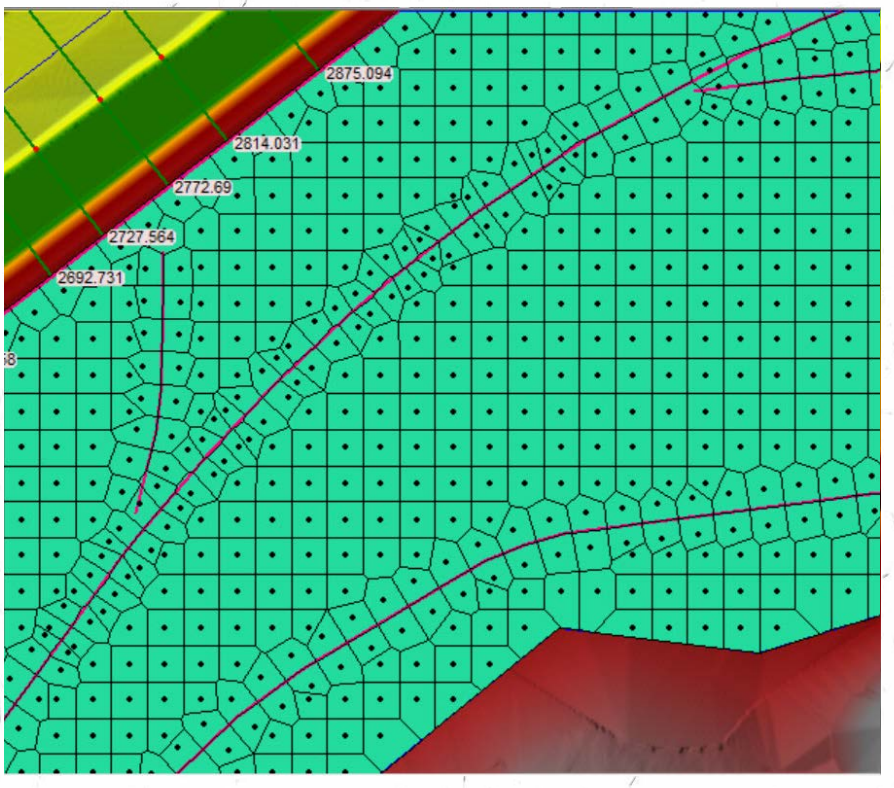
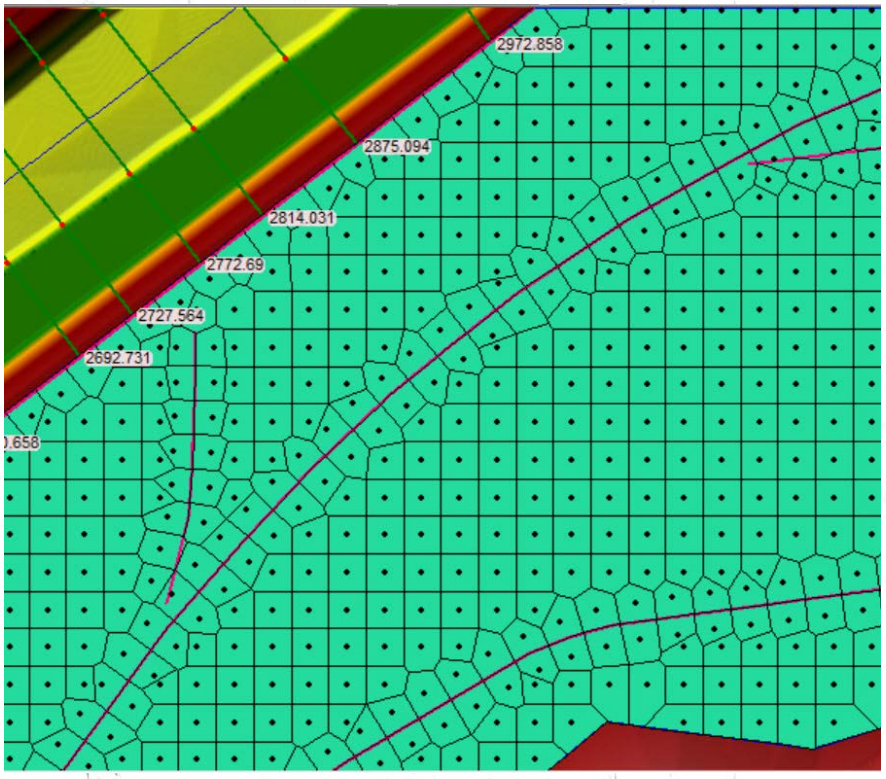
Adjust Terrain





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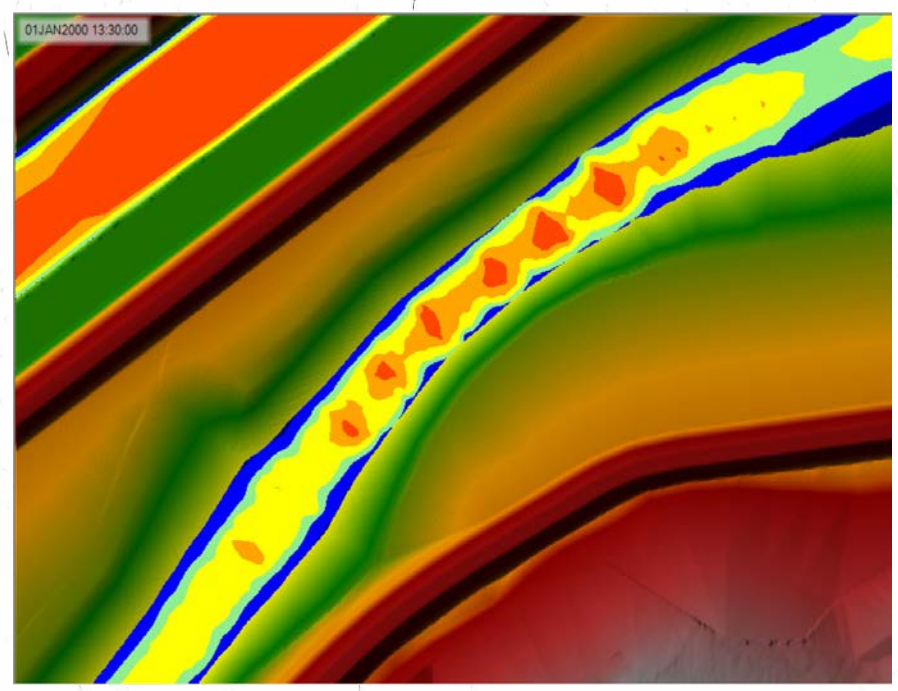
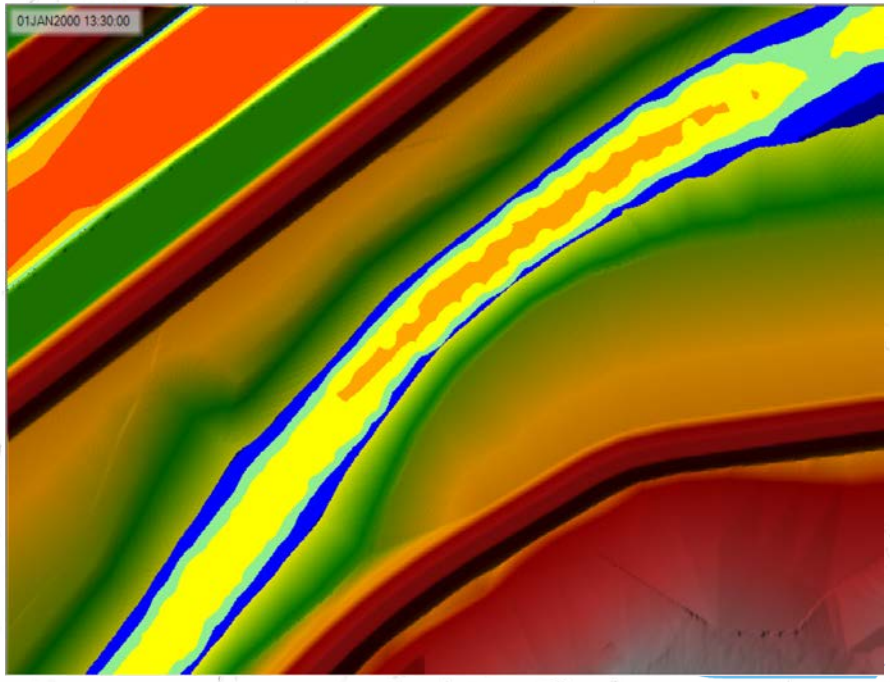
Adjusted



Base



Questions?